WE CLAIM:

l		1.	An apparatus for producing a diffraction pattern in an optical fiber,
2	the apparatus	compris	sing:
3		solid s	tate laser means for producing a fourth harmonic laser beam having
ŀ	a wavelength	in the ra	ange of approximately 230 to 250 nanometers; and
5		means	for using the fourth harmonic laser beam to produce the diffraction
ó	pattern on the	optical	fiber.
		2.	The apparatus of claim 1, wherein the solid state laser means
,	comprises:	2.	The apparatus of claim 1, wherein the solid state laser means
	comprises.	active	laser means; and
ı			for pumping the active laser means.
			Too parapara are are a same production
		3.	The apparatus of claim 1, wherein the solid state laser means
2	comprises:		
3		means	for producing a second harmonic beam from a fundamental beam;
ŀ	and		
5		means	for producing a fourth harmonic beam from the second harmonic
ó	beam.		
		4.	The apparatus of claim 1, wherein the solid state laser means
2	operates in co	ntinuou	•
l		5.	The apparatus of claim 1, wherein the solid state laser means
2	further compr	ises a Q	-switch.
		6.	The apparatus of claim 2, wherein the active laser means comprises
•	a crystal done	d with a	rare earth element.
l		7.	The apparatus of claim 2, wherein the active laser means comprises
2	diode laser me	eans.	
ı		8.	The apparatus of claim 2, wherein the active laser means comprises
,	a doped garne		••
•	a dopou garno	. orysta	•

1	9.	The apparatus of claim 2, wherein the pumping means comprises	
2	means for producing an IBC laser beam.		
1	10.	The apparatus of claim 3, wherein the second harmonic means	
2	comprises means fo	r minimizing beam walkoff.	
1	11.	The apparatus of claim 3, wherein the fourth harmonic means is	
2	selected to minimize	••	
1	12.	The apparatus of claim 3, wherein the solid state laser means	
2	further comprises:		
3	first	resonator means; and	
4	activ	e laser means, wherein the active laser means and the second	
5	harmonic means are disposed within the first resonator means.		
1	13.	The apparatus of claim 3, wherein the solid state laser means	
2	further comprises:		
3	first	resonator means;	
4	secoi	nd resonator means; and	
5	activ	e laser means, wherein the active laser means is disposed within the	
6		s and the second harmonic means is disposed within the second	
7	resonator means.	the second manners means to disposed within the second	
'	resonator means.		
1	14.	The apparatus of claim 4, wherein the solid state laser means	
2	further comprises:		
3	first i	resonator means;	
4	secon	nd resonator means;	
5	third	resonator means;	
6	activ	e laser means for producing a fundamental beam;	
7	secon	nd harmonic means for producing a second harmonic beam from the	
8	fundamental beam;	and	
9	fourt	h harmonic means for producing a fourth harmonic beam from the	
0		am, wherein the active laser means is disposed within the first	
1		second harmonic means is disposed within the second resonator	
2		harmonic means is disposed within the third reconstant means	

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1	15. The apparatus of claim 5, wherein the Q-switch is operated to
2	produce the fourth harmonic beam at a pulse rate in the range of 5,000 to 20,000 Hz.
1	16. The apparatus of claim 5, wherein the Q-switch is operated to
2	produce the fourth harmonic beam with pulse widths in the range of 50 to 500
3	nanoseconds.
1	17. The apparatus of claim 6, wherein the active laser means comprises
2	a mixed garnet.
1	18. The apparatus of claim 6, wherein the active laser means comprises
2	an Nd:YAG laser operated on a transition at approximately 946 nanometers.
1	19. The apparatus of claim 6, where the rare earth element is chosen
2	from the list of neodymium and ytterbium.
_	
1	20. The apparatus of claim 7, wherein the diode laser means comprises
2	a VCSEL which generates a fundamental beam having a wavelength in the range of 920-
3	1000 nanometers.
1	21. The apparatus of claim 7, wherein the diode laser means comprises
2	an InGaAs diode laser which generates a fundamental beam having a wavelength of 920-
	-
3	1000 nanometers.
1	22. The apparatus of claim 7, wherein the solid state laser means
2	further comprises:
3	first resonator means; and
4	doubler means for producing a second harmonic beam from a fundamental
5	beam emitted by the diode laser means, wherein the diode laser means and the doubler
6	means are disposed within the first resonator means.
1	 The apparatus of claim 8, wherein pumping means comprises an

2. IBC diode bar laser which emits a pump beam having a wavelength in the range of approximately 802 to 812 nanometers.

24. The apparatus of claim 11, wherein the fourth harmonic means comprises a CLBO crystal.

1		25.	The apparatus of claim 22, wherein the solid state laser means
2	further compr	rises:	
3		secor	nd resonator means; and
4		fourt	h harmonic means for producing a fourth harmonic beam from the
5	second harmo	nic be	am, wherein the fourth harmonic means is disposed within the second
6	resonator mea	ans.	
1		26.	The apparatus of claim 24, wherein a wavelength of the active lase
2	means is sele	cted su	ch that the CLBO crystal operates in a noncritically phasematched
3	state.		
1		27.	An apparatus for producing a diffraction pattern in an optical fiber
2	the apparatus	compr	ising:
3		a soli	d state laser for producing a fourth harmonic laser beam having a
4	wavelength in the range of approximately 230 to 250 nanometers, wherein the solid state		
5	laser compris	es:	
6			an active laser medium; and
7			a pump for pumping the active laser medium; and
8		a Bra	gg writer for using the fourth harmonic laser beam to produce the
9	diffraction pa	ttern o	n the optical fiber.
1		28.	The apparatus of claim 27, wherein the solid state laser operates in
2	continuous w	ave mo	ode.
1		29.	The apparatus of claim 27, wherein the solid state laser further
2	comprises:		
3		a dor	abler crystal for producing a second harmonic beam from a
4	fundamental beam emitted by the active laser medium; and		
5		a qua	drupler crystal for producing a fourth harmonic beam from the
6	second harmo	onic be	am.
1		30.	The apparatus of claim 27, wherein the solid state laser further
2	comprises a C	Q-swite	h.

1			The apparatus of claim 27, wherein the active laser medium
2	comprises a crys	stal do	ped with a rare earth element.
1	3	2.	The apparatus of claim 27, wherein the active laser medium
2	comprises a dioc	de lase	r.
1	3	3.	The apparatus of claim 27, wherein the active laser medium
2	comprises a dop	ed gar	net crystal.
1	3	4.	The apparatus of claim 27, wherein the pump comprises an IBC
2	diode bar laser.		
1	3	5.	The apparatus of claim 27, wherein the active laser medium
2	comprises a mixed garnet.		
1	3	6.	The apparatus of claim 27, wherein the active laser medium
2	comprises an No		laser operated on a transition at approximately 946 nanometers.
	•		
1		7.	The apparatus of claim 28, wherein the solid state laser further
2	comprises:	. .	
3			esonator;
4			d resonator;
5	a	third 1	resonator;
6	a	n activ	re laser medium for producing a fundamental beam;
7	a doubler crystal for producing a second harmonic beam from the		
8	fundamental beam; and		
9	a	quadr	upler crystal for producing a fourth harmonic beam from the
0	second harmonic beam, wherein the active laser medium is disposed within the first		
1	resonator, the doubler crystal is disposed within the second resonator and the quadruple		
2	crystal is dispos	ed with	hin the third resonator.
1	. 3	8.	The apparatus of claim 29, wherein the doubler crystal is selected
2	to minimize bea	m wal	koff.

The apparatus of claim 29, wherein the quadrupler crystal is

39. The apparatus selected to minimize beam walkoff.

1	40. The apparatus of claim 29, wherein the quadrupler crystal		
2	comprises a CLBO crystal.		
3	41. The apparatus of claim 29, further comprising a first resonat	or,	
4	wherein the active laser medium and the doubler crystal are disposed within the fir	st	
5	resonator.		
ì	42. The apparatus of claim 29, further comprising:		
2	a first resonator; and		
3	a second resonator, wherein the active laser medium is disposed wit	hin the	
4	first resonator and the doubler crystal is disposed within the second resonator.		
1	43. The apparatus of claim 30, wherein the Q-switch is operated	to	
2	produce the fourth harmonic beam at a pulse rate in the range of 5,000 to 20,000 Hz.		
1	44. The apparatus of claim 30, wherein the Q-switch is operated	to	
2	produce the fourth harmonic beam with pulse widths in the range of 50 to 500		
3	nanoseconds.		
1	45. The apparatus of claim 30, wherein the Q-switch is operated	to	
2	produce the fourth harmonic beam with peak power in the range of 500 to 2000 was	tts.	
1	46. The apparatus of claim 31, where the rare earth element is cl	osen	
2	from the list of neodymium and ytterbium.		
1	47. The apparatus of claim 32, wherein the diode laser comprise		
		5 a	
2	VCSEL which generates a fundamental beam having a wavelength of 920-1000		
3	nanometers.		
1	48. The apparatus of claim 32, wherein the diode laser comprise	s an	
2	InGaAs diode which generates a fundamental beam having a wavelength in the range of		
3	920-1000 nanometers.		
1	49. The apparatus of claim 32, wherein the solid state laser furth	er	
2	comprises:		
2	a first reconstant and		

4	a doubler crystal for producing a second harmonic beam from a			
5	fundamental beam emitted by the diode laser, wherein the diode laser and the doubler are			
6	disposed within the first resonator.			
1	50. The apparatus of claim 33, wherein pumping means comprises an			
2	IBC diode bar laser which emits a pump beam having a wavelength in the range of			
3	approximately 802 to 812 nanometers.			
1	51. The apparatus of claim 39, wherein the CLBO crystal is			
2	noncritically phasematched.			
1	52. The apparatus of claim 49, wherein the solid state laser further			
2	comprises:			
3	a second resonator; and			
4	a quadrupler crystal for producing a fourth harmonic beam from the			
5	second harmonic beam, wherein the quadrupler crystal is disposed within the second			
6	resonator.			
1	53. A method for producing a diffraction pattern in an optical fiber, the			
2	method comprising the steps of:			
3	pumping an rare-earth doped crystal with a diode laser to generate a			
4	fundamental beam;			
5	producing a second harmonic beam from the fundamental beam;			
6	irradiating a CLBO crystal with the second harmonic beam to produce a			
7	fourth harmonic beam having a wavelength in the range of approximately 230 to 250			
8	nanometers, with the wavelength of the fundamental beam chosen such that the CLBO			
9	crystal operates noncritically phasematched; and			
0	using the fourth harmonic beam as an input beam to a Bragg writer for			
1	producing the diffraction pattern on the optical fiber.			
1	54. The apparatus of claim 53, further comprising the step of			
2	producing the fourth harmonic beam at a pulse rate in the range of 5,000 to 20,000 Hz.			
1	55. The apparatus of claim 53, further comprising the step of			
2	producing the fourth harmonic beam with pulse widths in the range of 50 to 500			
3	nanoseconds.			

- 1 56. The apparatus of claim 53, further comprising the step of
- 2 producing the fourth harmonic beam with peak power in the range of 500 to 2000 watts.